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January 28, 2003

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Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W., Room TW-B204
Washington. DC 20554

Re: <u>CORRECTED Written Ex Parte Presentation in ET Docket No. 98-153</u>

Dear Ms. Dortch:

Pursuant to Section 1.1206 of rhc Commission's Rules 47 C.F.R. § 1.1206, please find two copies of a January 27, 2003 written *ex parte* presentation enclosed for inclusion in the record of the above-referenced proceeding. The presentation, which was made on behalf of the 31 companies and associations identified in the letterhead of the enclosure hereto, was transmitted electronically and/or by hand to the office of Chairman Powell, the offices of Commissioners Abernathy, **Copps,** Martin, and Adelstein, and to officials within the Commission's Office of Engineering and Technology. The list of recipients within the Commission is shown on page 7 of the enclosure.

Please direct any questions concerning this matter to the undersigned

Sincerely,

Raul R. Rodriguez

RRR:rlp

CORRECTED

Air Transport Association of America • American Airlines Inc. •
American Medical Response • ARINC • AT&T Wireless Services •
Deere & Co. • Delta Air Lines, Inc. • eRide, Inc. • Garmin International, Inc. •
General Aviation Manufacturers Association • Global Locate, Inc. •
Lockheed Martin Corporation • Multispectral Solutions, Inc. •
National Business Aviation Association, Inc. • National Ocean Industries Association •
NavCom Technology, Inc. • Nortel Networks, Inc. •
Northwest Air Lines, Inc. • Omnistar, Inc. •
PanAmSat Corporation • QUALCOMM Incorporated • Raytheon Company •
*Rockwell Collins, Inc. • SiRF Technology, Inc. *Sirius Satellite Radio, Inc. •*
Spatial Technologies Industry Association • Sprint Corporation •
Tendler Cellular, Inc. • Trimble Navigation Ltd. • United Air Lines •
United States GPS Industry Council

January 27, 2003

The Honorahlc Michael Gallagher
Deputy Assistant Secretary of Commcrcc for Communications
And Information
National Telecommunications and
Inlormation Administration (NTIA)
Hcrbert Clark Hoover Building
14th Street and Constitution Avenue, N.W.
Washington, D.C. 20230

Re: ET Docket No. 98-153 (FCC Ultra-Wideband Proceeding)

Dear Mr. Gallagher:

The signatory companies and associations write to bring to your attention the technical and regulatory treatment being developed in Europe by CEPT for the potential introduction of Ultra-widcband (UWB) devices and networks into the European radio frequency spectrum. Although these CEPT emission limits have only recently been introduced into ITU-R studies, the CEPT approach evidences both prudence and support for introducing UWB technology. This approach protects public safety and a variety of commercial and government applications while preserving the potential of existing digital services and technologics to continue to innovate. We believe that this approach evinces a reasoned balance of inipoitant policy goals and should be of valuc and interest to NTIA in the ongoing intergovernmental discussions on the implementation and review of the regulatory approach to UWB adopted by the FCC last year.

The CEPT approach takes into account the technical and practical parameters of UWB technology while also recognizing the need to "offer more interference protection to critical sensitive services operating below 3.1 GHz" (e.g., they propose a slope mask and extending the –75 dBm/MHz at 1660 in a flat line below 960 MHz). See Attachment **A.** CEPT also concludes that UWB cannot fully use a staircase spectrum mask as developed by thc FCC, and that an additional advantage of a slope mask is that such a mask does not reducc the performance of UWB products. Finally, wc note that the proposed CEPT emission mask, in anticipation that 98% of UWB applications will be in communications and measurement systems, provides greater protection to safety-of-life systems in frequencies at and below 1 GHz than does the mask adopted by the FCC.

We recognize that the CEPT approach to UWB remains under development, and acknowledge that it may not adequatcly address all concerns that existing radiocommunication services have wirh UWB technology in frequency bands between 3.1 GHz and 10.6 GHz. At the same lime, however, we also recognize that CEPT has arrived at these conclusions through a deliberative process that focuses on the attributes and aptitudes of UWB technology. We believe that the CEPT slope mask, at least in its current iteration, is the right approach to take below 3.1 GHz, because it is fundamentally objective and avoids the pitfalls of a political debate conducted in an information vacuum. Further work on the CEPT approach may be required lo adequatcly protect radiocommunication services in certain bands above 3.1 GHz. The U.S. and the world are just now beginning to climb the steep educational cui-ve that is associated with the recent emergence of UWB technology, and there is not yet sufficient meaningful operational cxpcnence with actual UWB devices to fully understand how this technology affects existing technologies and systems. Until we can be certain that UWB applications will not interfere with safety-of-lifc systems, an objective approach that introduces new technologies without compromising safety or the ability of existing digital technologies and services to continue to innovate is what is needed.

It would be most unfortunate for the United States, and particularly the FCC, under these circumstances, tu use the penditig reconsideration process in ET Docket No. 98-153 to relax the restrictions arid emissions limits below 3.1 GHz. The objective evidence to support the conclusion that such a change will not interfere with critical, safety-of-life systems and existing digital services has not been provided to the FCC. Consequently, we strongly urge no change in the existing UWB rules:

- No communications below 3.1 GHz (licensed/unlicensed; indoor/outdoor)
- No relaxation of existing emission limits, including GPS (-105 dBW/MHz)
- Protect the noise tloor in the radiofrequency bands in the National Airspace (NAS)
- No expansion of eligibility below 3.1 GHz to use different categories of UWB devices

Wc note that several Canadian contributions submitted to the ITU-R Task Group 1/8 recognize that the susceptibility threshold of several mobile communication services is comparable to the GPS receiver susceptibility baseline that the FCC used in developing the emission limits in the FCC First Report and Order. *See* Attachment B. Canada recognizes that the noise tloor of these digital services needs protection at levels that preserve the ability of these service providers to continue to innovate and compete domestically as well as internationally. While Europe's balanced approach *will* ensure that the EU will reap maximum economic benefit from the ongoing digital innovation of all sectors, and including UWB, the U. S. may well find itself at a competitive disadvantage from raising the noise floor in all sectors of its digital services. We strongly encourage NTIA to reflect upon this dcvelopmcnt and take this into account in any decisions on UWB emission limits.

Finally, it is important to note that UWB emissions universally increase the noise floor for all applications: indoor, outdoors, the military, aviation, public safety (e.g. E911), commercial, and consumers. In particular, to adequately pi-otect GPS applications, UWB emission limits should not be raised above the already established –105.3 dBW/MHz (-75.3 dBm/MHz). This limit protects the GPS noise floor and is consistent with that derived by the GPS Joint Program Office (*see* Attachment C).

The consequences of this issue are far too important for the United States. In light of the extensive international activity begun by the ITU-R Task Group 1/8, any attempts to modify the existing FCC limits below 3.1 GHz arc, at a minimum premature.

Respectfully submitted,

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Enclosures: Attachment A: FCC UWB Emission Limits and Proposed CEPT Emission Mask For Communication and Measurement Systems (Indoor/Outdoor)
Attachment B: Mobile System Parameters
Attachment C: Noise Floor Analysis

cc (w/ encl.): Hon. Michael K. Powell, Chairman, FCC
Hon. Kathleen Q. Abernathy, Commissioner, FCC
Hon. Michael J. Copps, Commissioner, FCC
Hon. Kevin J. Martin, Commissioner, FCC
Hon. Jonathan S. Adelstein, Commissioner, FCC
Ed Thomas, FCC Office of Engineering and Technology
Julius Knapp, FCC Office of Engineering and Technology
Karen Rackley, FCC Office of Engineering and Technology
John Reed, FCC Office of Engineering and Technology
Ron Chase, FCC Office of Engineering and Technology

ATTACHMENT A

FCC UWB EMISSION LIMITS AND PROPOSED CEPT EMISSION MASK FOR COMMUNICATION AND MEASUREMENT SYSTEMS (INDOORS) **[Switzerland: 1-8/32-E]**

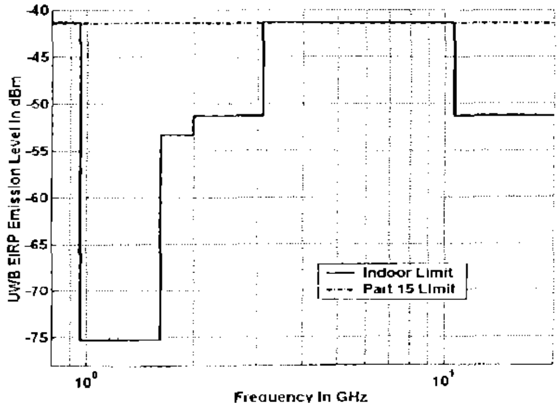

FIGURE 1

FCC UWB emissions limits for indoor communication and measurement systems. Units with center frequencies greater than 3.1 GHz

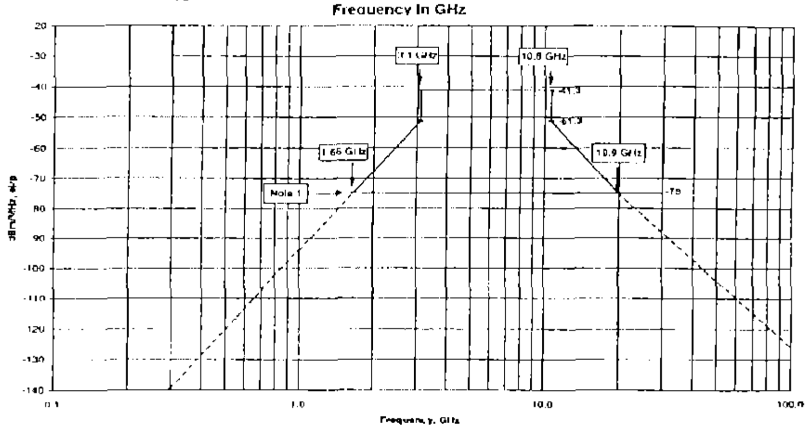

FIGURE 3
Indoor CEPT slope mask

3.3 Modified FCC Masks

The CEPT SE24 modified the new FCC UWB masks (s.3.2) below 960 MHz to a flat line by –75 dBm/MHz. This modification was proposed in order to protect the numerous radiocommunication applications in Europe that are centered at frequencies below 1 GHz.

3.4 Proposed CEPT slope mask

FCC issued a staircase spectrum mask limit for radiated power density. UWB cannot utilize the staircase mask fully and CEPT therefore proposes to use a sloped mask instead. The advantage of this mask is: a) a slope offers more interference protection to critical sensitive services operating below 3.1 GHz and above 10.6 GHz; b) a slope itself does not reduce the performance of UWB products. At low frequencies, an attenuation roll-off for the proposed mask meets FCCs requirement at 3.1 and 1.66 GHz with a radiated power density limits of –51.3 dBm/MHz (indoors); -61 dBm/MHz (outdoors) and –75 dBm/MHz respectively.

ATTACHMENT A
(Continued)

FCC UWB EMISSION LIMITS AND PROPOSED CEPT EMISSION MASK FOR COMMUNICATION AND MEASUREMENT SYSTEMS (OUTDOORS) **[Switzerland: 1-8/32-E]**

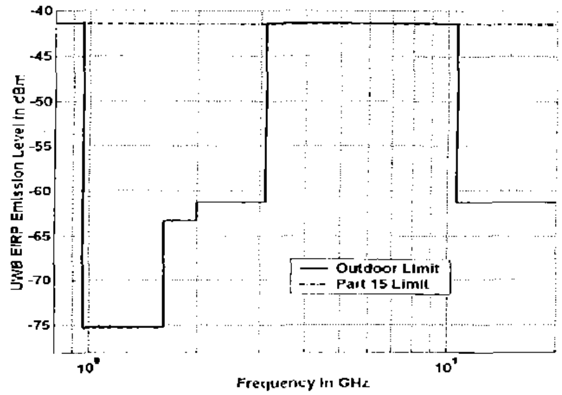

FIGURE 2

FCC UWB emissions limits for outdoor communication and measurement systems. Units with center frequencies greater than 3.1 GHz

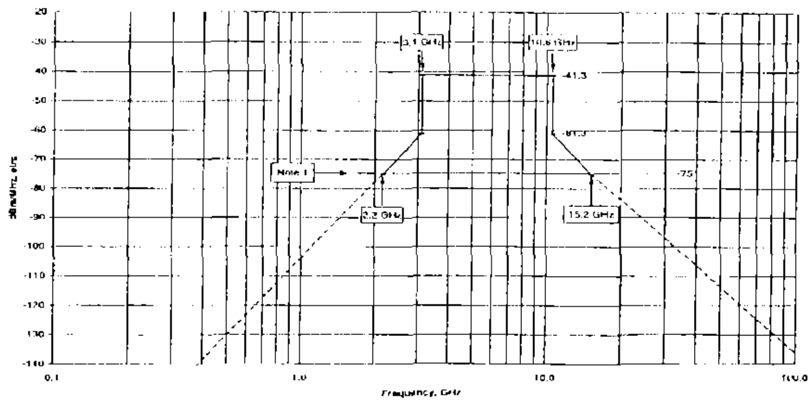

FIGURE 4
Outdoor CEPT slope mask

3.3 Modified FCC Masks
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3.4 Proposed CEPT slope mask
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ATTACHMENT B
MOBILE SYSTEM PARAMETERS

/19/0 3 ems	Source	Title	Additional Excerpts				
9	Canada	Proposed Text and Structure of A					
	1-8/26-E	Recommendation and A Report on		Mobile System Parameters		(Page 8)	
		Compatibility Between Devices Using	System	Carrier Freq/MHz	Bandwidth	System Sensitivity	Sensitivity
		UWB Technology and			(MHz)	(dBm)	(dBm)
		Radioc ommunication Services	DFCT GSM	1880 950	1.728 0.2	-97 -108	-99.4 -101
			CDMA-2000 1X	1900	1.25	-110	-111
			UMTS/WCDMA FDD	2100	3.84	-105	-110.8
11	Canada	Compatibility Between Receivers					
	1-8/33-E	of the Mobile Communications		Mobile System Parameters		(Page 5)	
		Services and Emissions By UWB	System	Carrier Freq/MHz	Bandwidth	System Sensitivit	Sensitivity
		Devices			(MHz)	(dBm)	(dBm)
			DFCT	1880	1.728	[illegible]	-99.4
			GSM	950	0.2	-108	-101
			CDMA-2000 1X	1900	1.25	-110	-111
			UMTS/WCDMA FDD	2100	3.84	-105	-110.8
			GPS L1	1500	10		-117.5

ATTACHMENT C
NOISE FLOOR ANALYSIS

Tlicrmal noisc is the correcl approach to accounting for noisc factors because it includes hoth the ambicnt noise temperature and rhe receiver noise tcmperature. They interact with each othcr and not in a linear way. The receiver noise iemperature softens the effect of the ambient noisc and somctimes dominates. One of reasons for the higher ambient noise indoors is the fact that thc antenna is looking at thc warm walls, instead of the cold sky. Walls are *3* or more times warmcr (in absolute temperature) than the sky, resulting in **4** to 5 dB more ambienl noise.

The equation for N_0 in FCC TRB report is not correct for the noise floor. The equation only describes "receiver" noise – it does not include ambient source noise. The correct equation for thermal noise density, in dBW/Hz is

$$N_0 \approx 10\log_{10}\left[kT_s + kT_0\left(10^{.1NF} - 1\right)\right]$$

where T_s is thc source tcmperature in K, k is Boltzman's constant (1.38 x 10^{-23} Watts/K-Hz), T_0 is 290 K, and NF is thc rcccivcr noise figure in dB.[1] This source tempcrature is usually takcn to bc 100 **K** using an omni-directional antenna outdoors, accounting for ground clutter. This results in a source ambient thermal noise equal to -118.6 dBm/MHz. The source noisc tcmperature would be 290 K indoors. When using a horn antenna such as was used in the FCC TRB report, pointed at the sky, the source temperature could be much lower because "ground clurrer" is essentially eliminated. This explains ambient noise incasurcd at -122 dBm/MHz. Howcvcr, if thc Sun is located in a narrow beam, the source temperature could be much higher.

For aviation applications, as dcnved by RTCA, a noise figure of about 4 dB is used as typical for including pre-filtering and lighrning protection losses, thus the noise density (111.5 dBm/MHz) is 7.1 dB higher than the ambient source noise density.

One might argue that for indoor and outdoor handheld or automotive GPS receivers, a lower noise figure is possible duc to lcss stringent protection requirements than aviation. However, indoors, rhe lowcr noise figure is offset by a highcr source temperature. An increase in sourcc tcmperature of 2.9 (290 K instcad of lOOK) would require the noise i'igurc to be reduced to 1.82 to achicvc thc same overall thermal density. This is quite low, so the conclusion is that thc assumed noise density (-111.5 dBm/MHz) is universal.

The above equation does not include ambient radio noise (interference). The total noise density, including this intetfercncc (such as UWB emissions), is

$$N_{0\,total} \approx 10\log_{10}\left[kT_s + kT_0\left(10^{.1NF} - 1\right) + 10^{.1N_I}\right]$$

[1] B. W. Parkinson and J. J. Spilker, Jr., Editors, Global Positioning Svstem: Theory and Applications I. Chapter 8, pp. 343-344. **AIAA,** 1996.

ATTACHMENT C
NOISE FLOOR ANALYSIS
(Continued)

whcrc N_I is the intcrference noisc dcnsity in dBW/Hz. To have a negligible impact, this intcrference noise dcnsity should bc 6 dB less than the -11 l.5 dBm/MHz thermal noise density. Obviously, at 2 metcrs distance, the overall noisc floor will be raised (about I dB for thc NPRM emission level *of* -75.3 dBm/MHz). Figure 1 shows the increase in noise floor as a function of emission lcvel. This incrcasc in noise floor is consistent with that derived by the CPS Joint Program Officc.

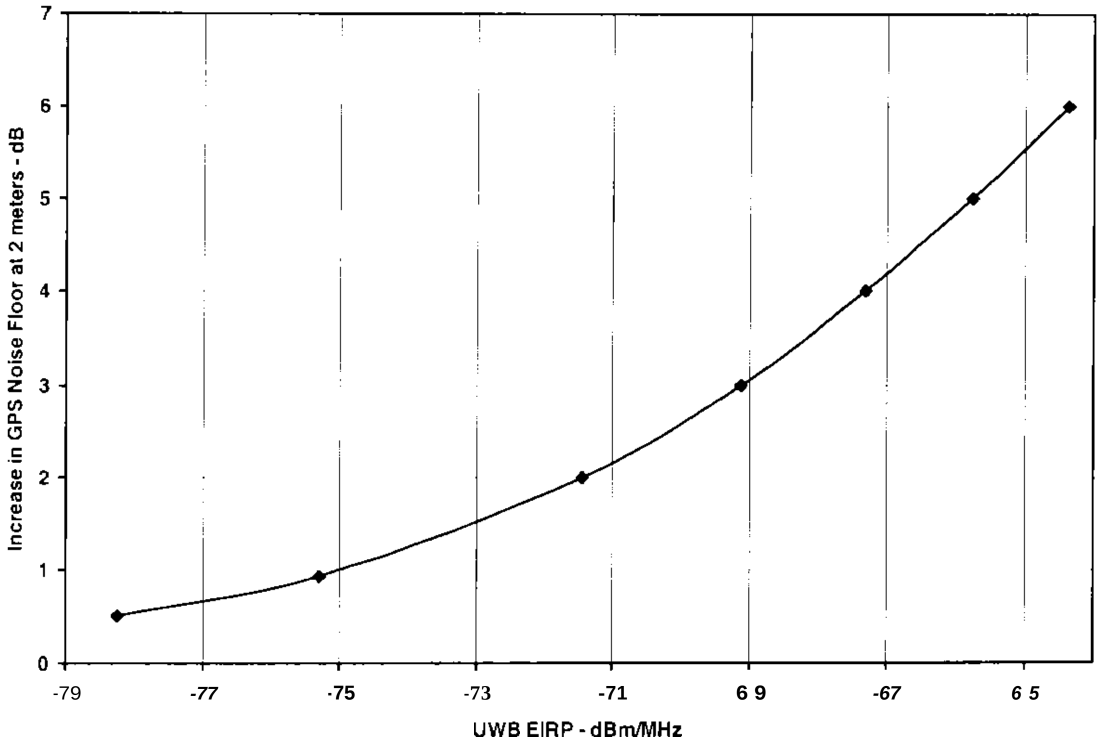

Figure 1. Rise in Noise Floor as a Function of UWB Emission Limit

It is also important to note that this degradation in noisc floor does not just apply to the GPS C/A Codc. Thc samc degradation also applies to thc GPS military P Code.

Wc can only conclude that UWB emissions universally increases the noise floor for all GPS applications – indoors, outdoors and aviation – and conclude that the UWB emission limits cannot be raised above thc already established -105.3 dBW/MHz limit.